Course guide
230075 - TCGI - Internet Transport, Control and Management

Last modified: 25/05/2023

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering.

Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Optional subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Consultar aquí / See here: https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura

Others: Consultar aquí / See here: https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma

PRIOR SKILLS

Basic Linux.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
06 URI N3. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

TEACHING METHODOLOGY

Guided activities
lectures
Laboratory Classes
Individual work (distance learning)
Short answer tests (Control)
Multiple choice tests
Laboratory practices

LEARNING OBJECTIVES OF THE SUBJECT

The goal of this course is to teach the most relevant aspects concerning routing protocols, transport and control in telecommunications networks, in particular, in the Internet.
Based on the knowledge about static routing acquired in previous courses, will present the different algorithms and dynamic routing protocols, both unicast and multicast. In addition, we will discuss certain protocols necessary for the Internet operation and some typical applications such as WWW.

Learning outcomes:

- It has capacity to build, operate and manage networks, services, processes and telecommunications applications from the point of view of telematic services.
- Is able to apply the techniques of switching and routing in fixed and mobile environments.
- Understands and applies the most appropriate protocols to transport information correctly and keep the sessions during transmission.
- Use the tools necessary to easily build, operate and manage ICT services, especially those related to the Internet, web and multimedia.
- Be familiar with the protocols and communication interfaces at different levels of the network architecture and be able to describe them, program them, validate them and optimize them.
- Know the technological progress of transmission, switching and the process to improve networks and online services.
- Design and implement a good strategy for searching specialized information. Identify the relevance and quality of this information.
- Perform tasks based on the guidelines set by the teacher, taking the time and the resources necessary. Assesses own strengths and weaknesses and act accordingly.

STUDY LOAD

Type	Hours	Percentage
Self study	85,0	56.67
Hours large group	39,0	26.00
Hours small group	26,0	17.33

Total learning time: 150 h

CONTENTS

Chapter1. Switching review

Description:
Basic switching concepts review. Switches, spanning tree and VLANs with Linux.

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 10h
Theory classes: 3h
Laboratory classes: 2h
Self study : 5h

Tema 2. IP Review

Description:
IP basics review and static routing.

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 10h
Theory classes: 3h
Laboratory classes: 2h
Self study : 5h

Chapter 3. Network Applications

Description:
Network applications and their relationship to the operating system. File descriptors and client server architecture. Use of the netcat tool.

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 10h
Theory classes: 3h
Practical classes: 2h
Self study : 5h

Chapter 4. DNS

Description:
Explanation of the name to IP translation system.

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 10h
Theory classes: 3h
Laboratory classes: 2h
Self study : 5h

Chapter 5. DHCP and WWW

Description:
Dynamic address assignment (DHCP). WWW including basic HTML and HTTP.

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 10h
Theory classes: 3h
Laboratory classes: 2h
Self study : 5h

Chapter 6. Firewalls and address translation

Description:
Firewall rules with iptables and dynamic address translation (NAT).

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 10h
Theory classes: 3h
Laboratory classes: 2h
Self study : 5h

Chapter 7. Tunnels

Description:
Description of networking technologies for tunnels.

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 9h
Theory classes: 1h 30m
Laboratory classes: 3h
Self study : 4h 30m

Chapter 8. Multicast

Description:
Description of multicast technologies.

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 10h
Theory classes: 2h
Laboratory classes: 3h
Self study : 5h

Chapter 9. Unicast dynamic routing

Description:
Algorithms of shortest path Bellman-Ford and Dijkstra. Protocols RIP, OSPF, BGP and MPLS.

Related activities:
Laboratory practice. Evaluation of the practice.

Full-or-part-time: 36h
Theory classes: 12h
Laboratory classes: 6h
Self study : 18h

Chapter 10. Introduction to IPv6

Description:
Introduction to IPv6

Full-or-part-time: 12h
Theory classes: 6h
Self study : 6h

ACTIVITIES

Laboratori exam with short answers

Description:
Partial exam of laboratory

Full-or-part-time: 1h
Laboratory classes: 1h

Final exam

Description:
Final exam

Full-or-part-time: 2h
Theory classes: 2h

GRADING SYSTEM

7 Test assesments: 10% x 7 = 70%
Laboratory control: 30%

BIBLIOGRAPHY

Basic:
- Huitema, C. Routing in the Internet. Prentice, 2000. ISBN 0130226475.
- Duato, J.; Yalamanchili, S.; NI, L.M. Interconnection networks: an engineering approach [on line]. Revised printing. San Francisco: Morgan Kaufmann Publishers, 2003 [Consultation: 10/10/2022]. Available on: https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=319192. ISBN 1558608524.